USACE Capabilities
Sediment Monitoring & Modeling

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USACE – USGS Joint Headquarters Meeting
National Center Auditorium
USGS Headquarters, Reston, VA
02 February 2010

US Army Corps of Engineers
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OUTLINE

- Overview of West Bay Diversion analysis
- Sediment Monitoring
- Sediment Modeling

Related Points

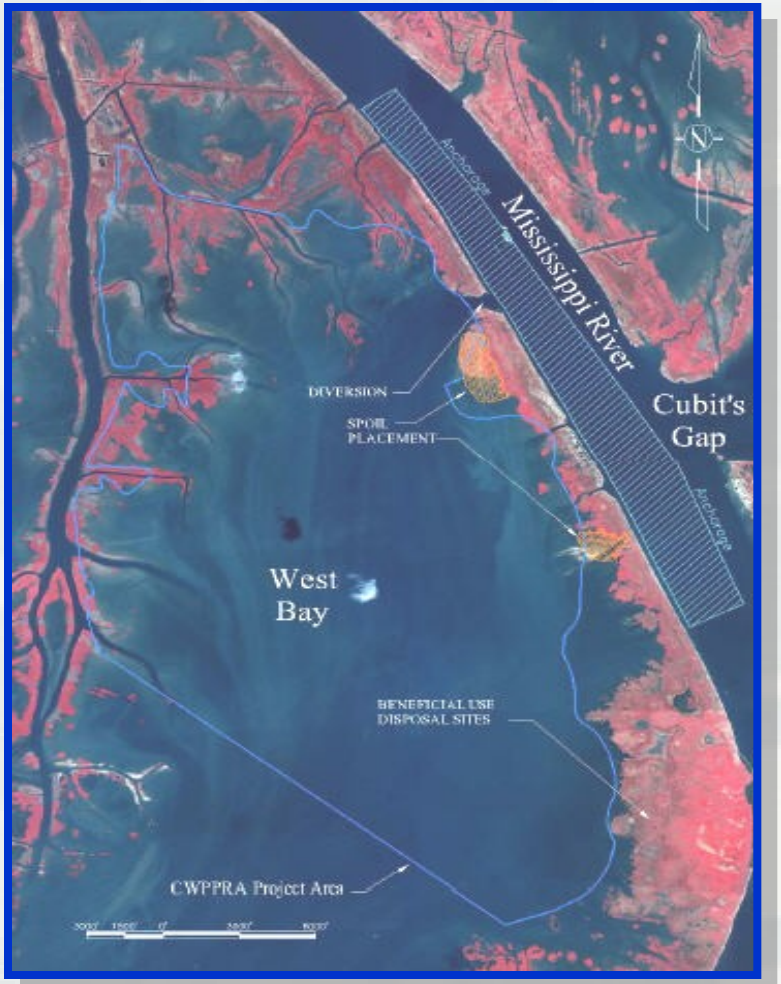
- Monitoring
  - Know what you want, why you want it, and how you'll use it.
  - Justify every deployment
- Monitoring Programs:
  - Long-term - background
  - Short-term - specific

West Bay Diversion

Hydraulic cutterhead dredge
Design 195ft wide, 25ft deep
Current – Width at river 1100ft
Width in throat 480 ft
Depth in throat 71 ft

West Bay Diversion

West Bay Area

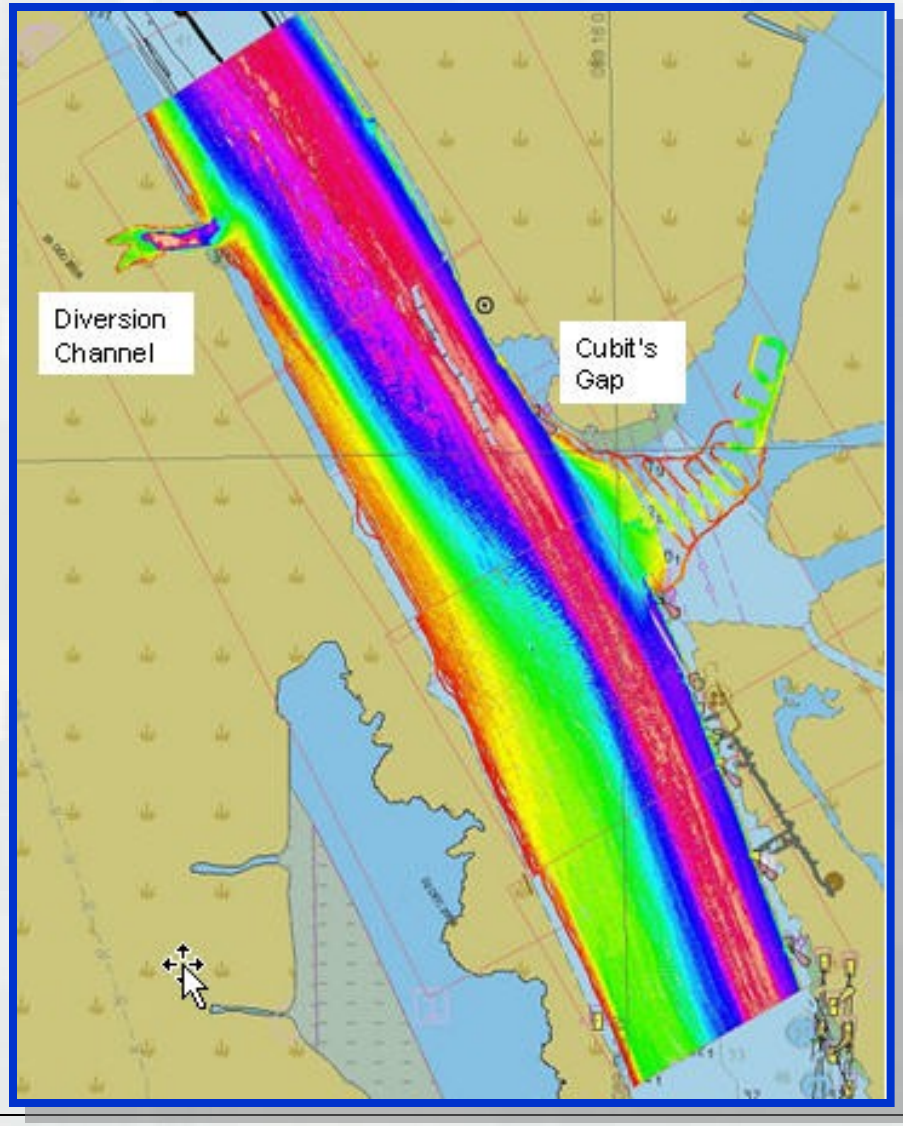


Analysis Approach

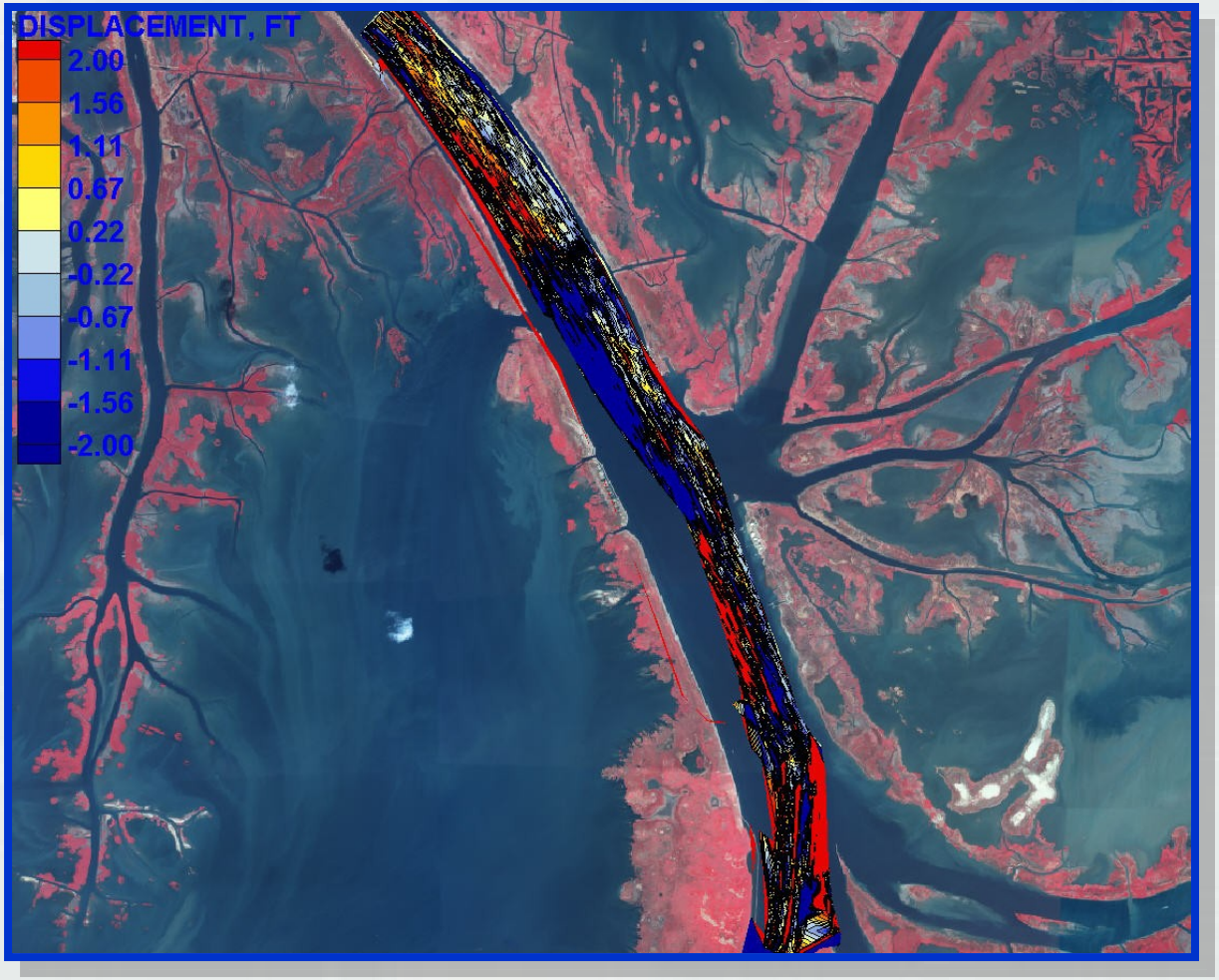
- Data collection & Analysis
- Geomorphic Analysis
- 1-D Sedimentation Modeling
- 2-D Sedimentation Modeling

MONITORING

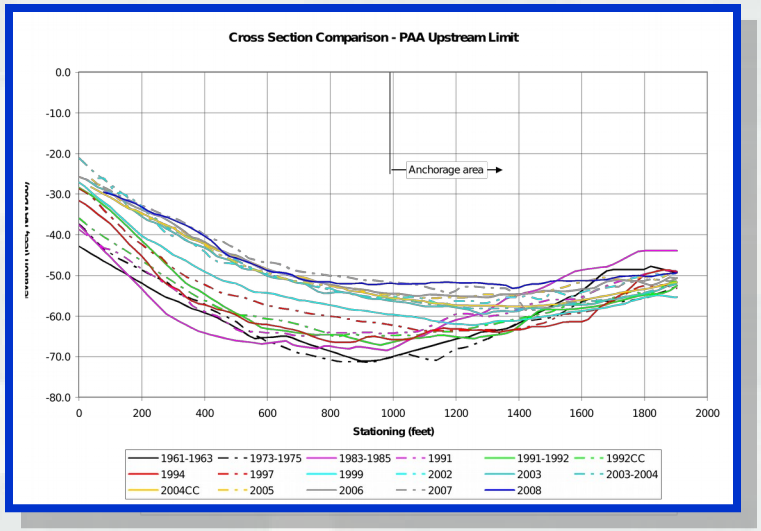
Multi-beam Survey

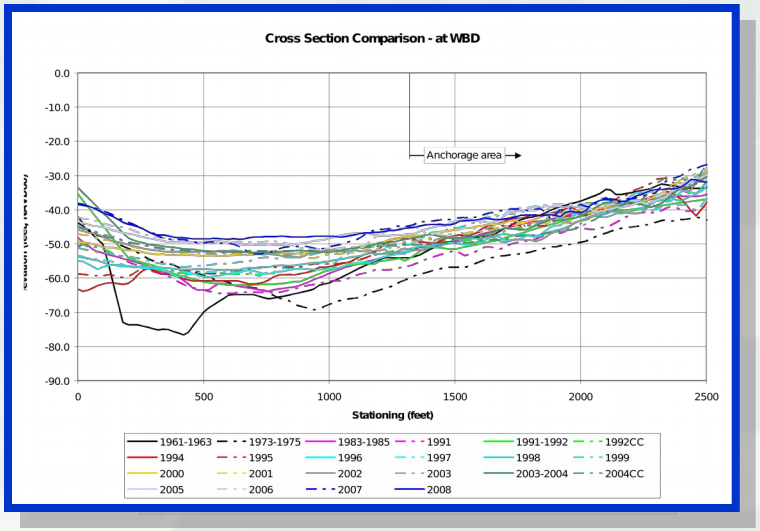


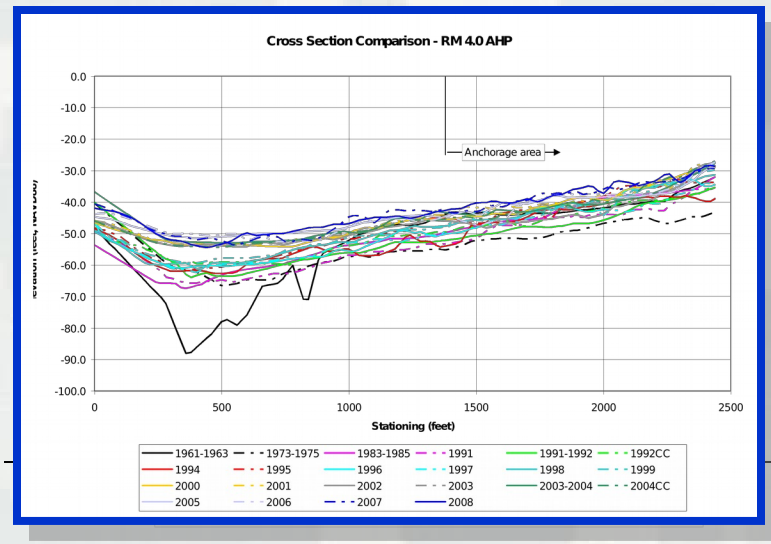
Channel Condition Surveys

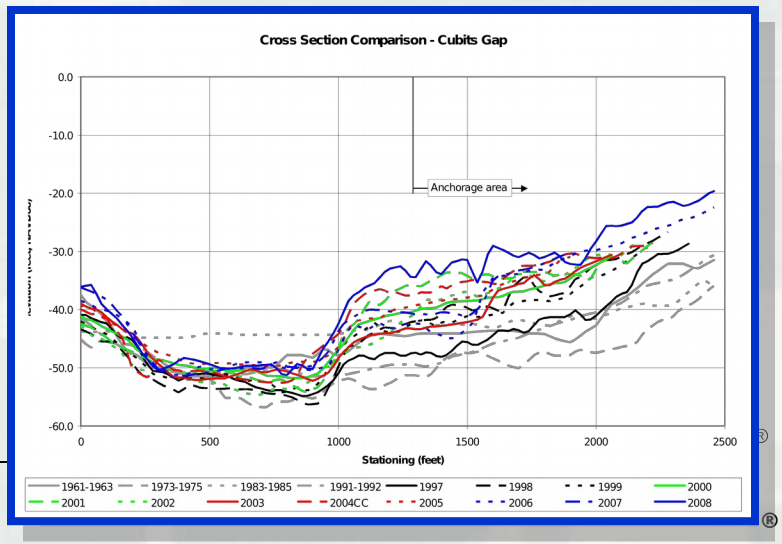


Geometric Data Analysis: Cross Section Comparisons

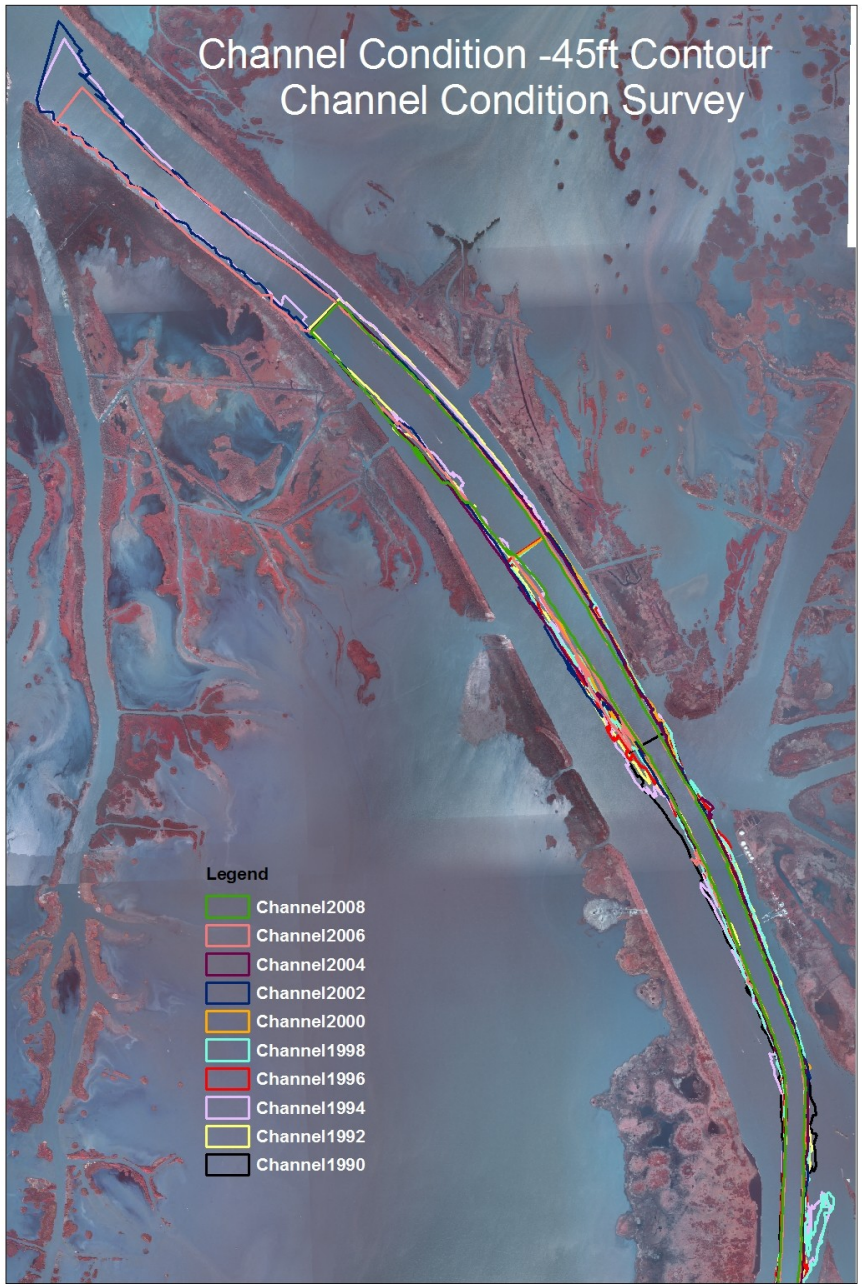




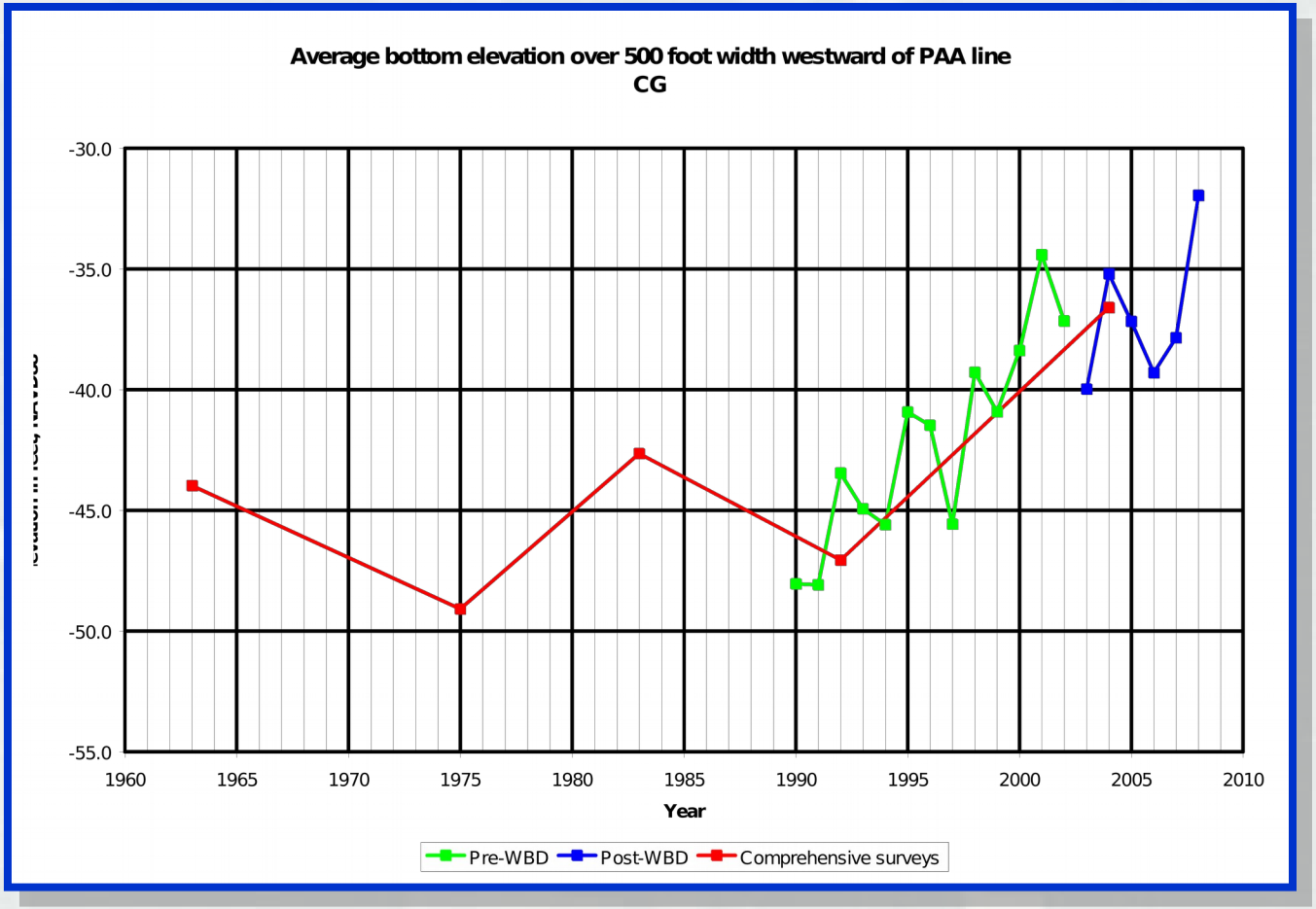




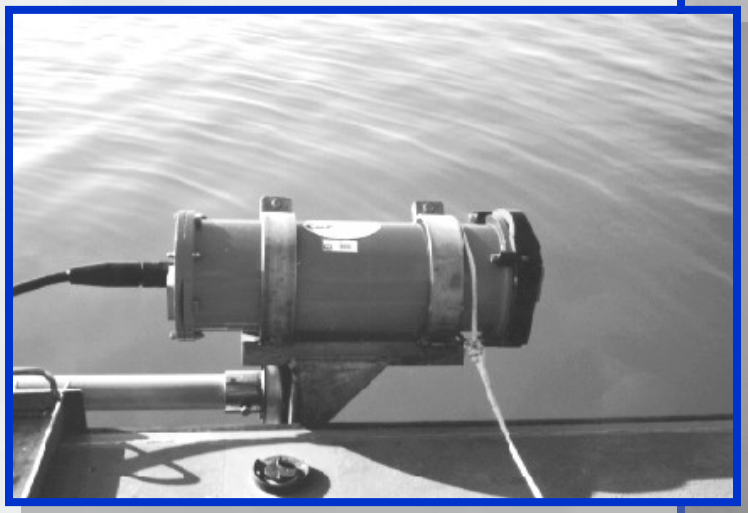
Channel Pattern Analysis

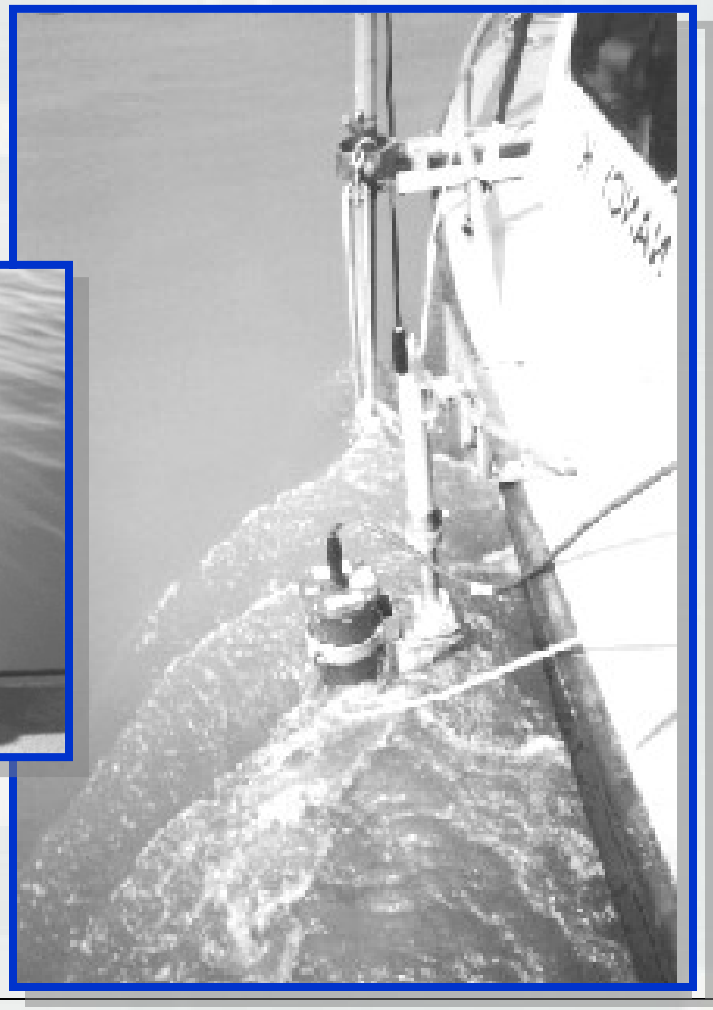


Average Bed Elevation Change



Acoustic Doppler Current Profiler (ADCP)





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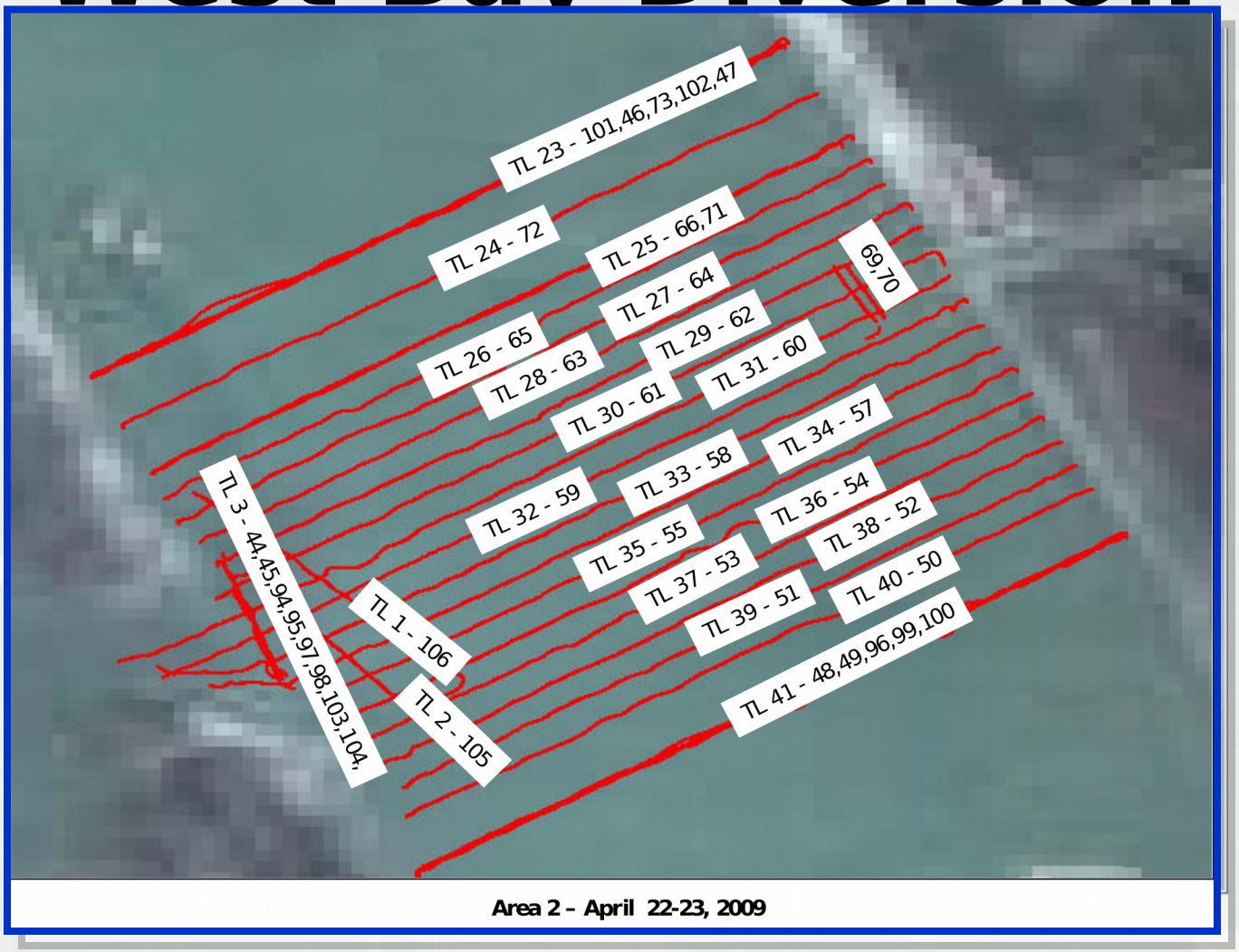
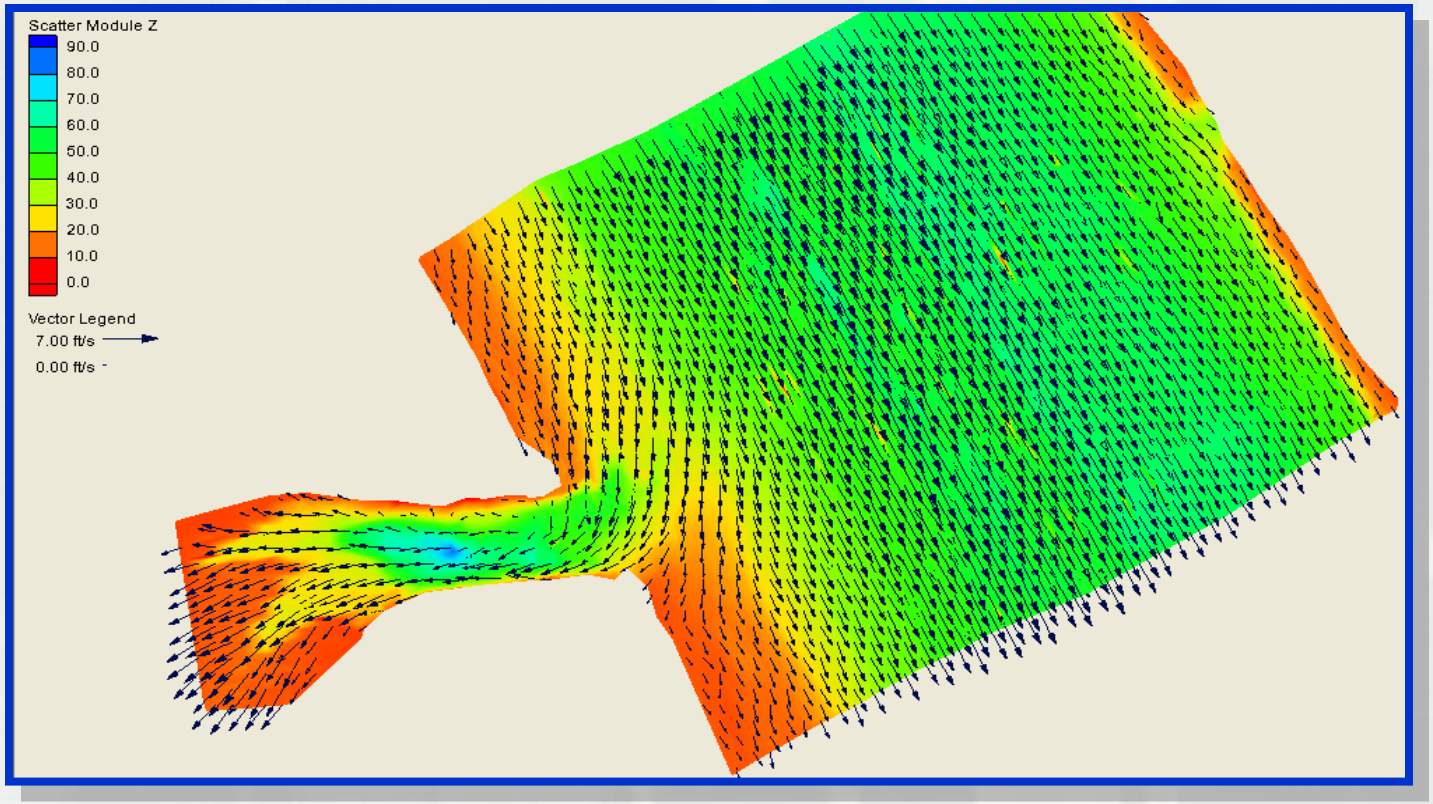
ADCP Transects West Bay Diversion



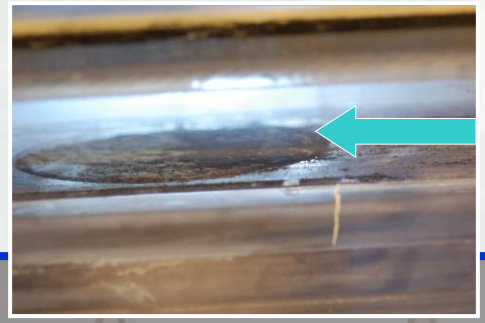
Water Velocities

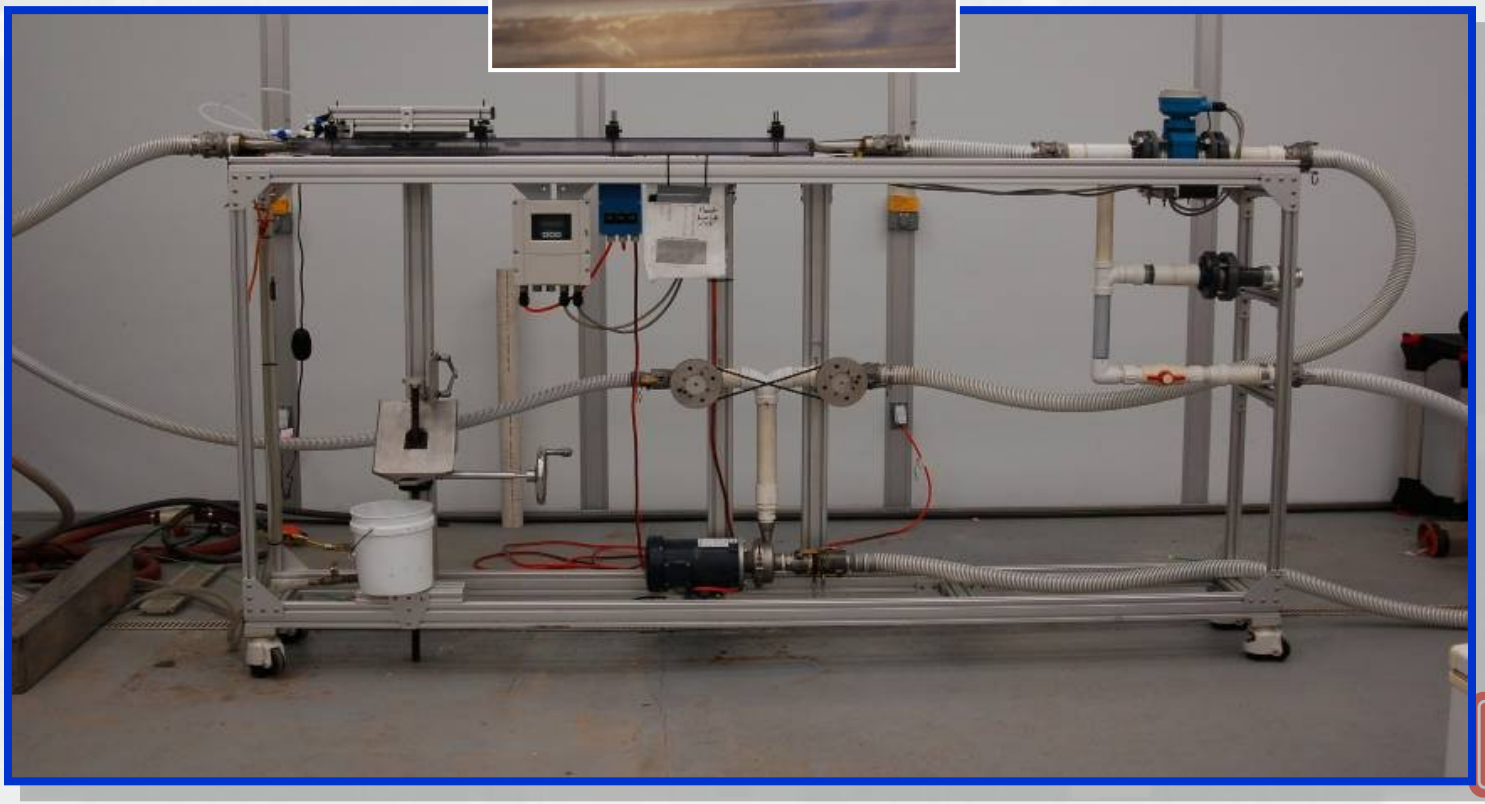


Suspended Sediments

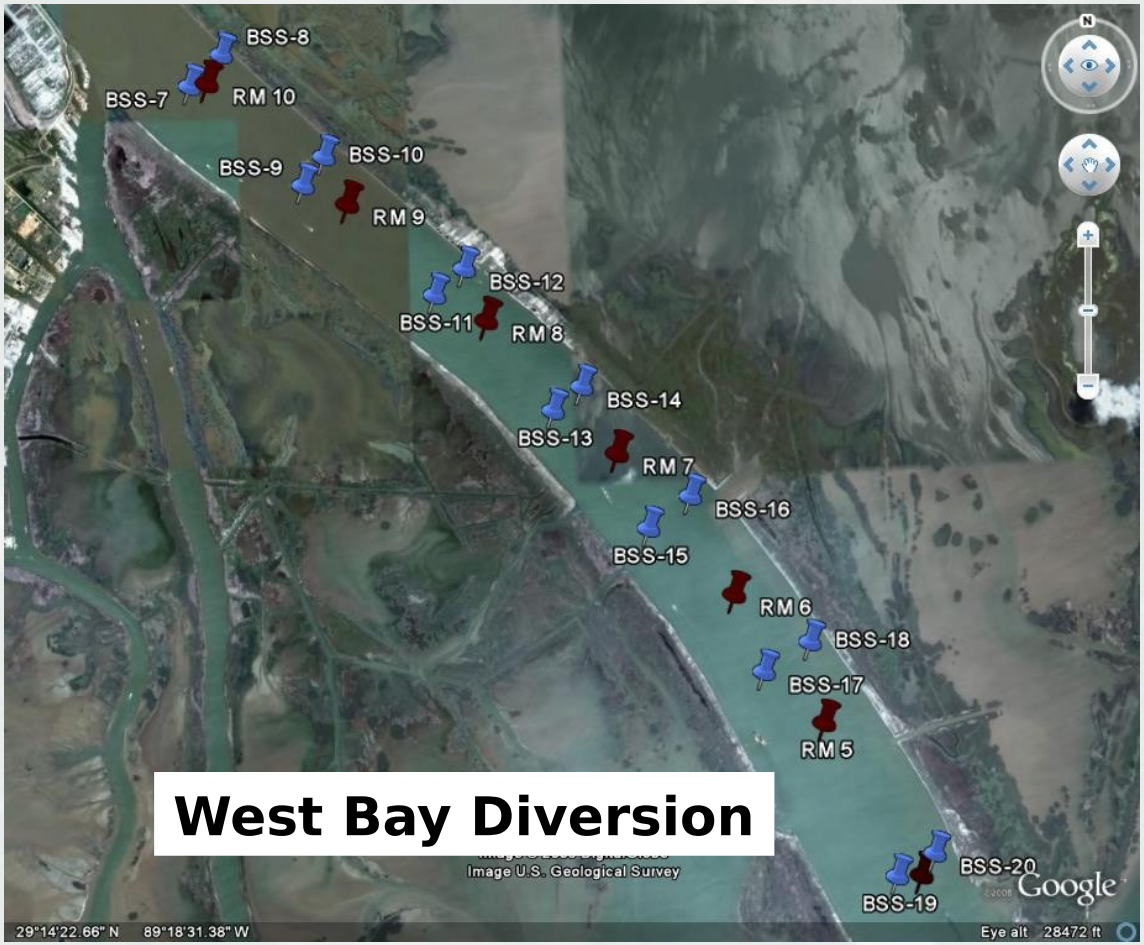
Suspended Sediment Measurements

Bed Sediments

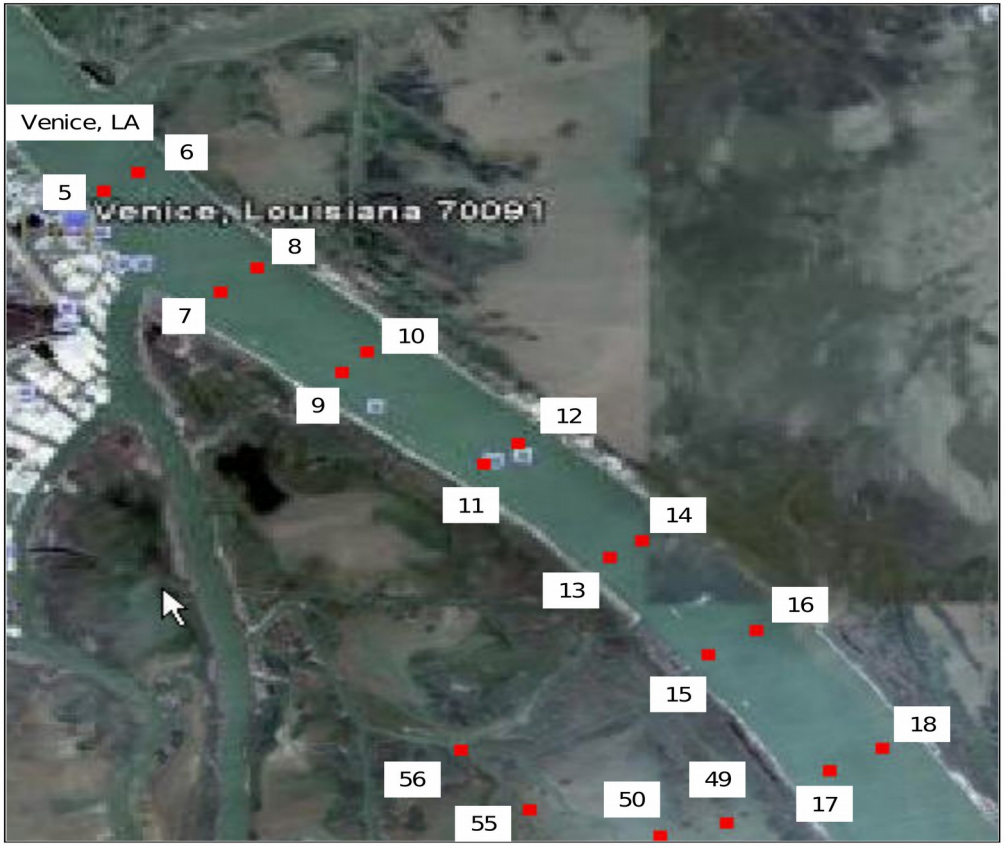




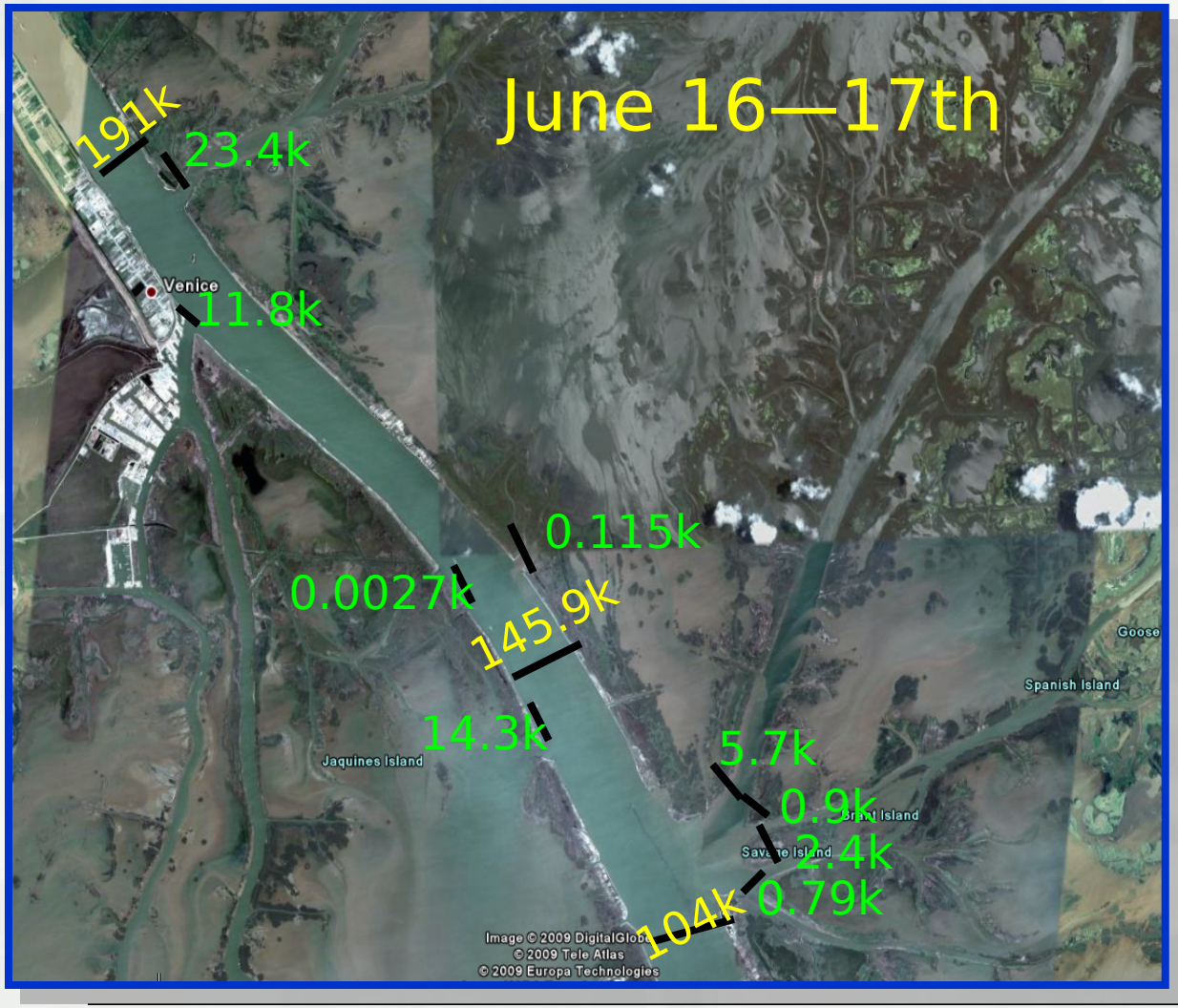
River Bed Sediment Measurements



Drag and Push-core Samples



Sediment Flux Computations



Line M2	Total Q (ft³/s)	Sed Flux (Tons/Day)
R-2.6 101 K	385,500	104 K
R-5.2 171 K	568,000	145.9K
R-6.5-LB 175 K	4,300	0.115 K
R-6.4-RB 0 K	600	0.003 K
R-12.1 200.0 K	698,500	191 K
CGRP 1.1 K	7,300	0.79 K
CGBB 3.4 K	21,000	2.4 K
CGOP 1.1 K	9,000	0.9 K
CGMP 8.6 K	50,000	5.7 K
WBD 16.0 K	51,500	14.3 K

MODELING

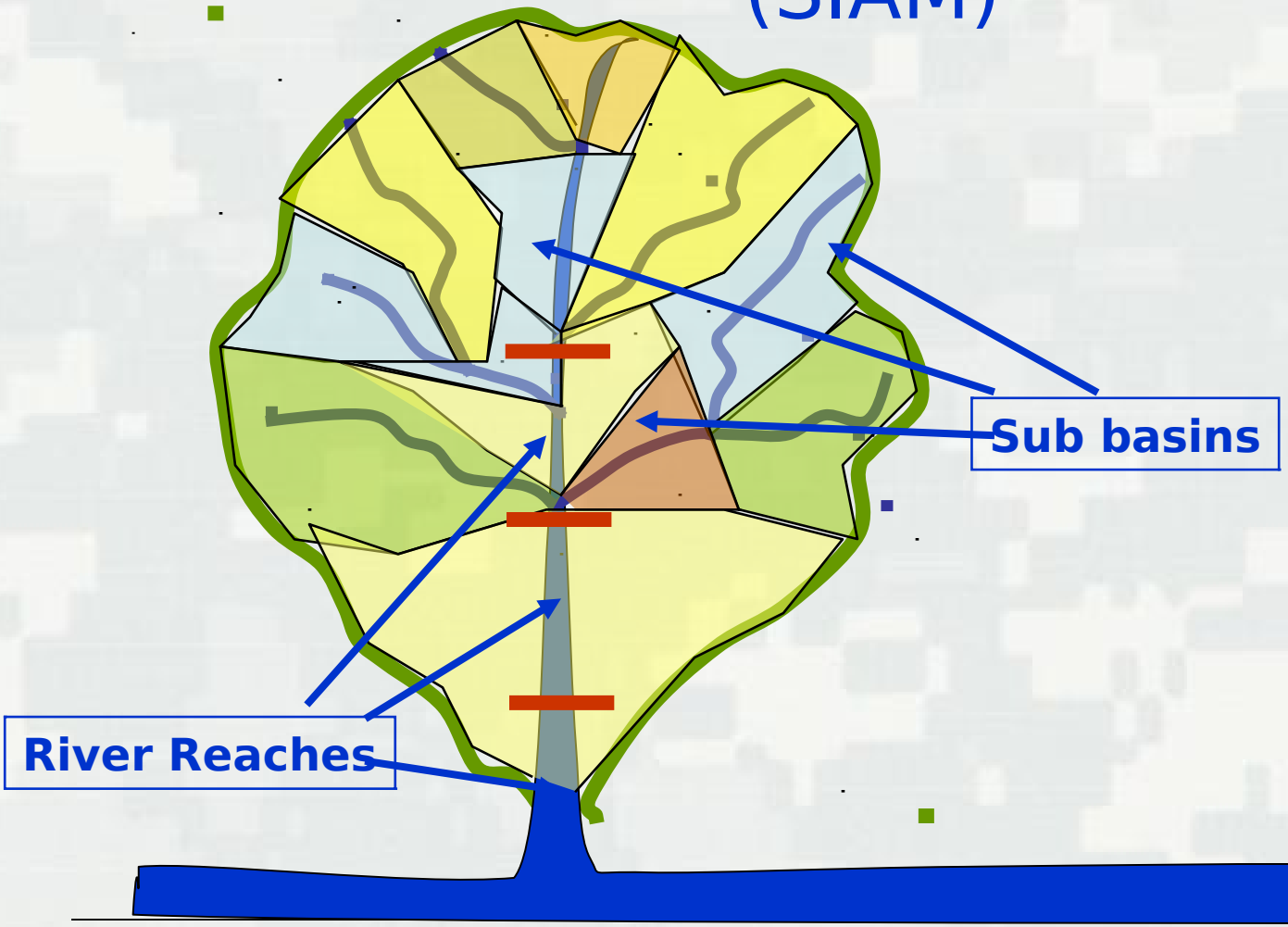
SEDIMENT BALANCE

PARTICLE TRACKING

SEDIMENT TRANSPORT

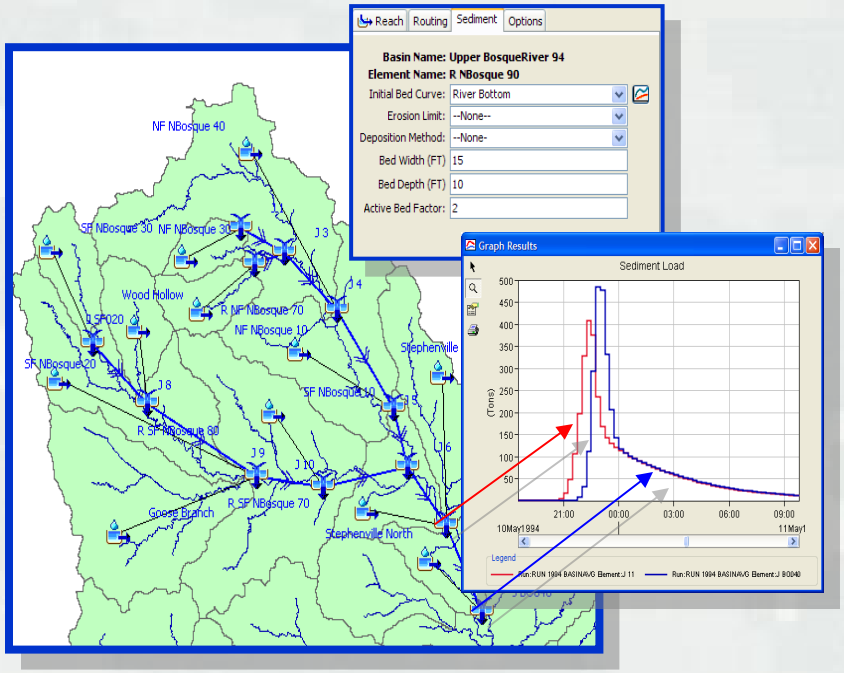
Sediment Balance

Sediment Impact Analysis Model (SIAM)

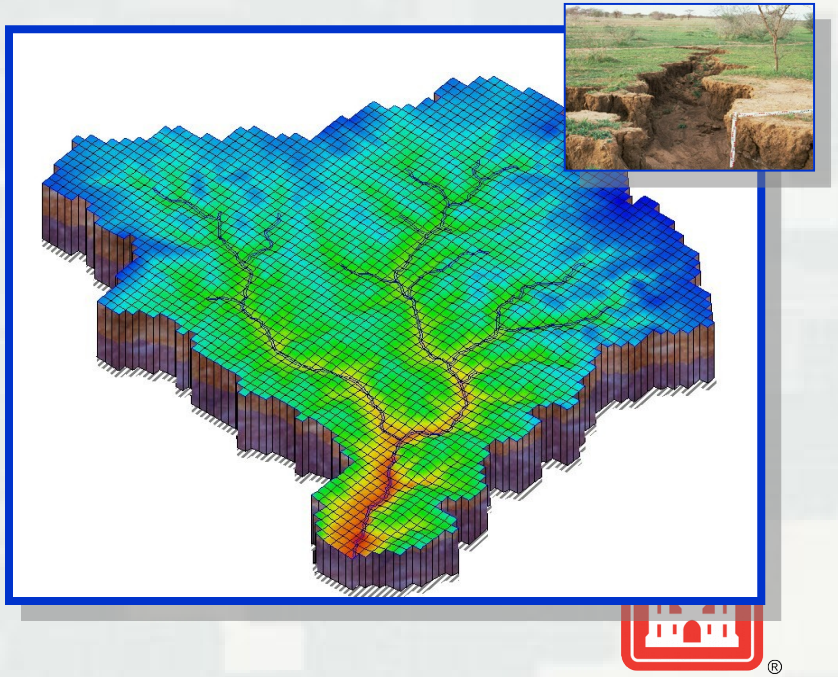


Watershed Models

HEC-HMS



GSSHA



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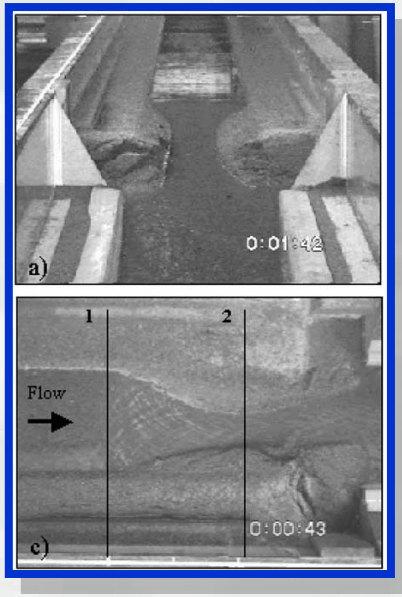
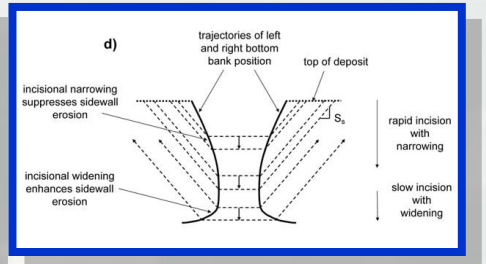
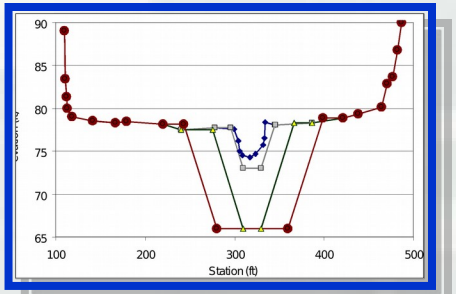
Dimensional Models

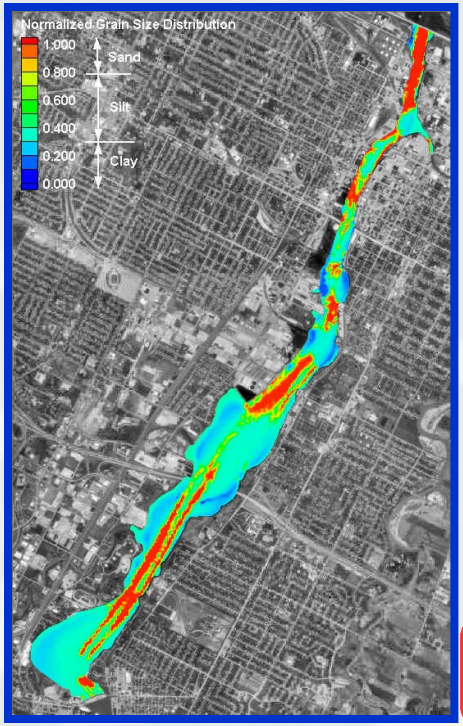
HEC-RAS



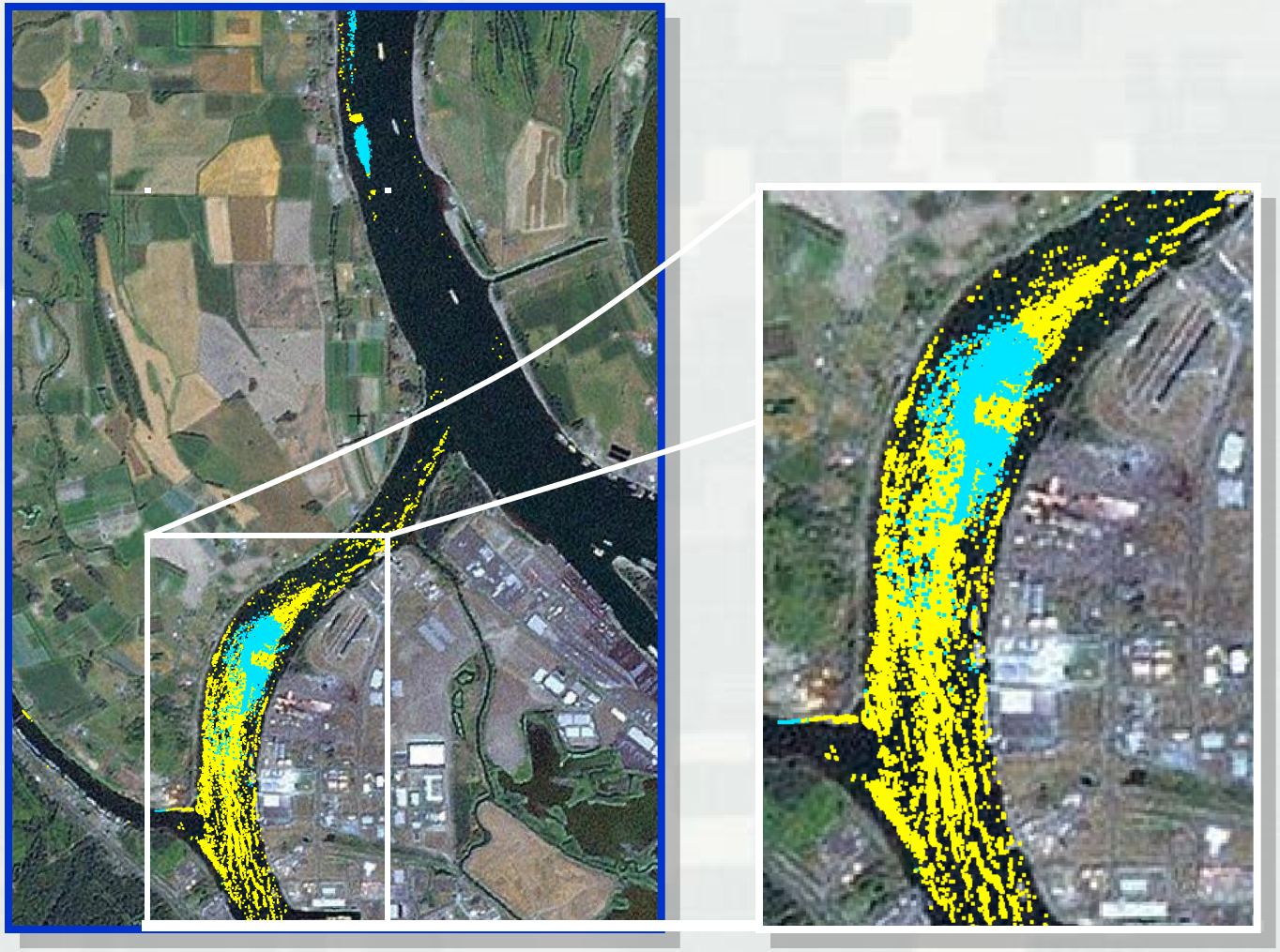

d)
trajectories of left and right bottom bank position
top of deposit
incisional narrowing suppresses sidewall erosion
incisional widening enhances sidewall erosion
rapid incision with narrowing
slow incision with widening



ADH



Particle Tracking (PTM)

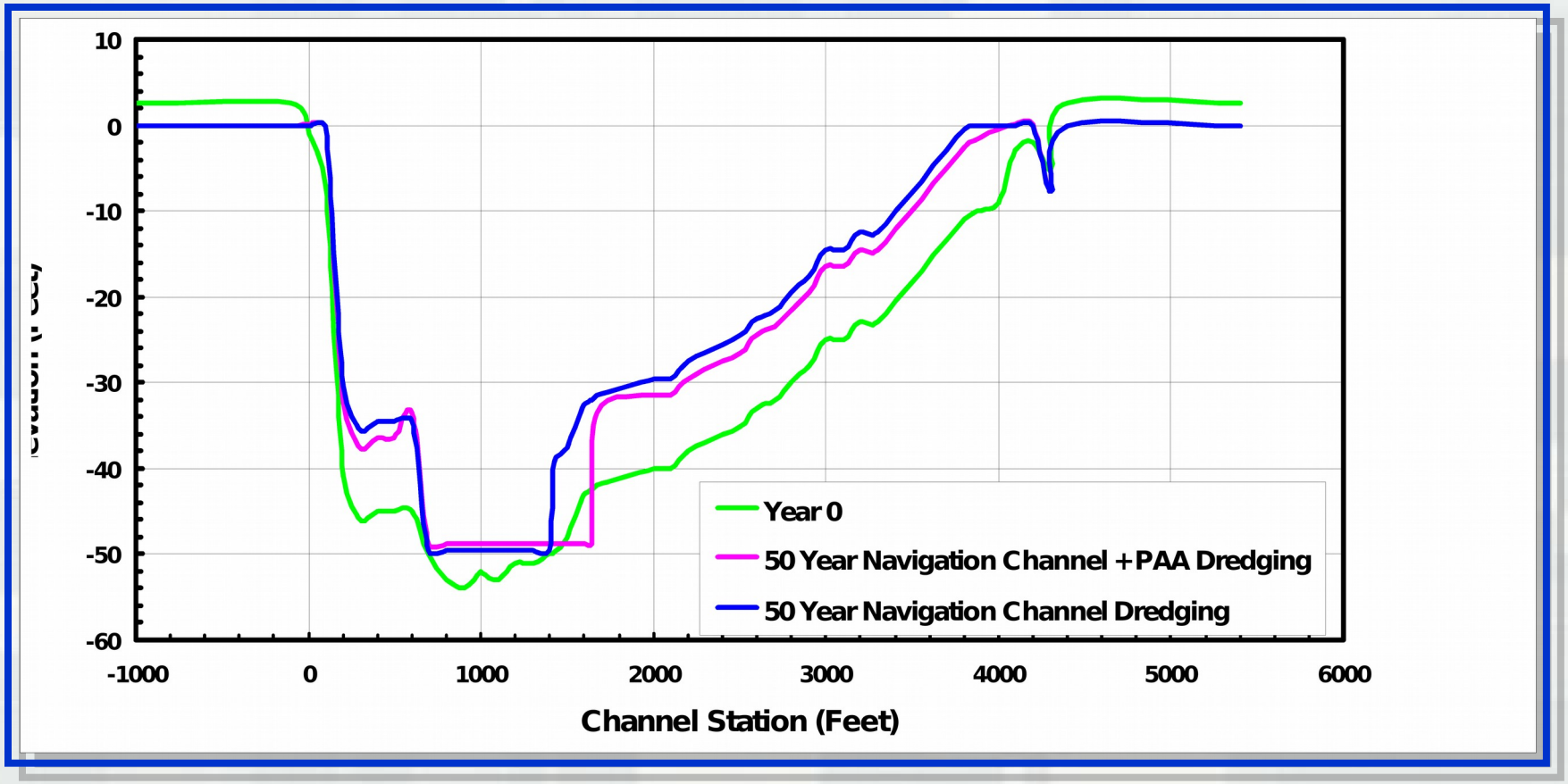


Computational Philosophy

Sediment Library – Open Source

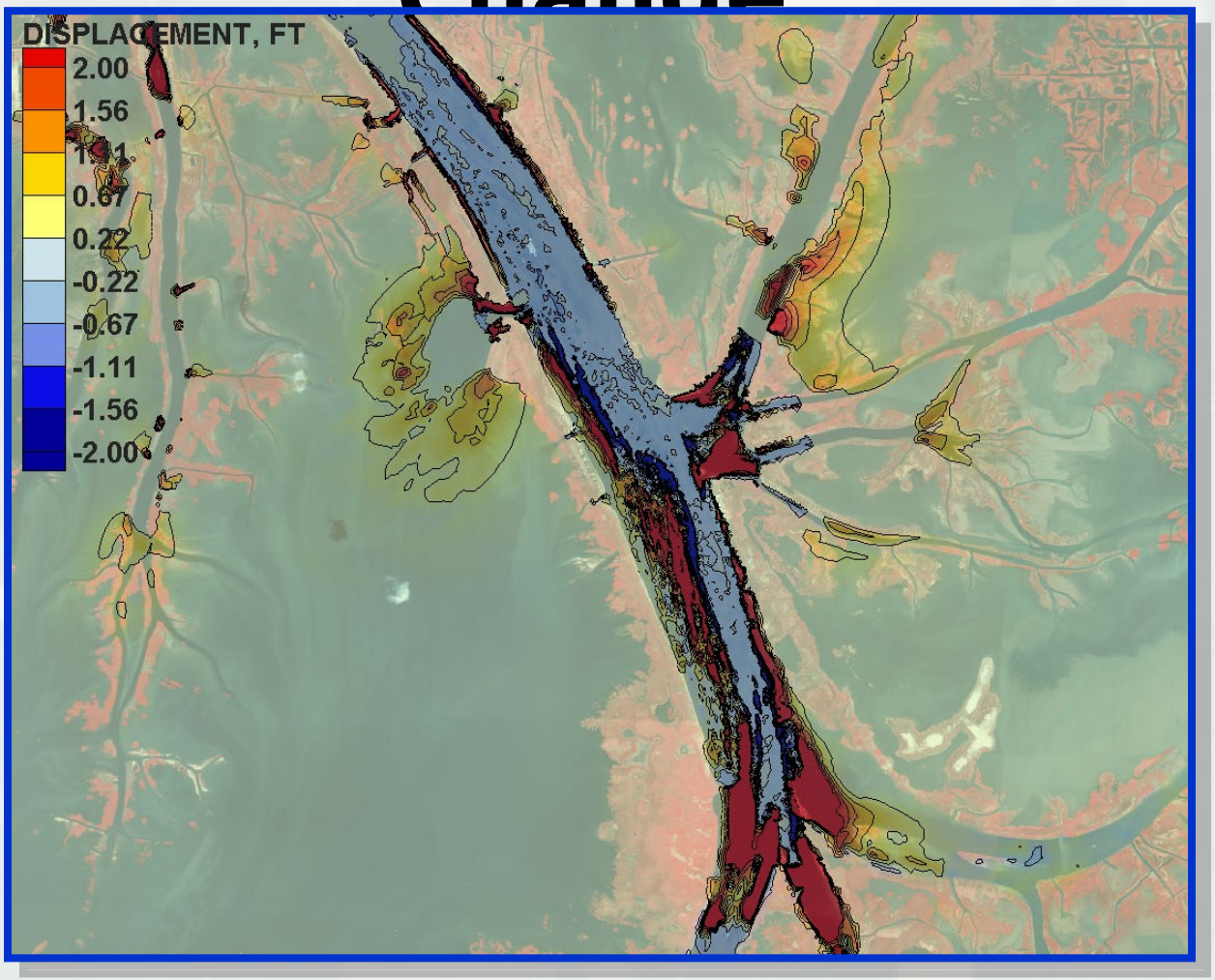
- Bed Layering
- Flocculation
- Settling Velocity
- Erosion/Deposition Relations
- Non-equilibrium corrections
- Bed Slope corrections
- Armoring
- Transport Functions

1-D Model

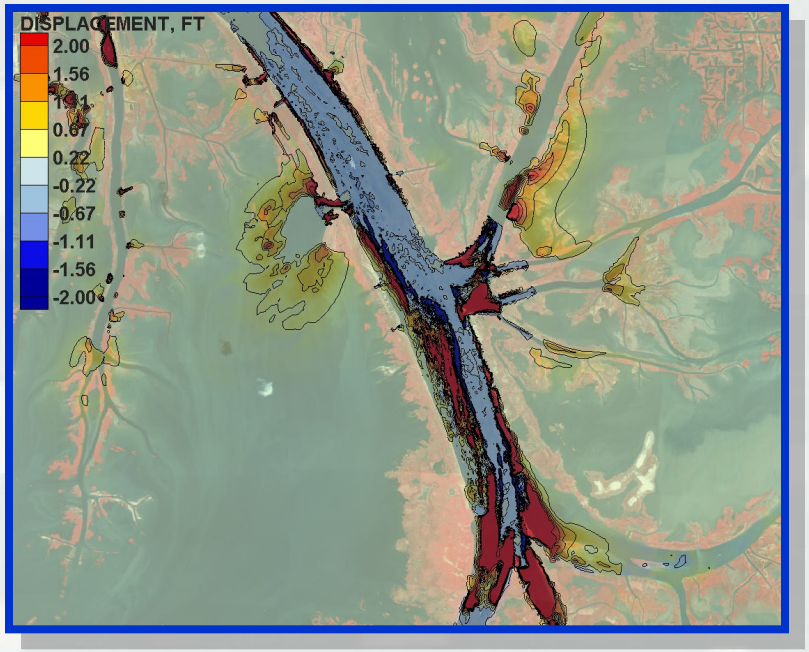


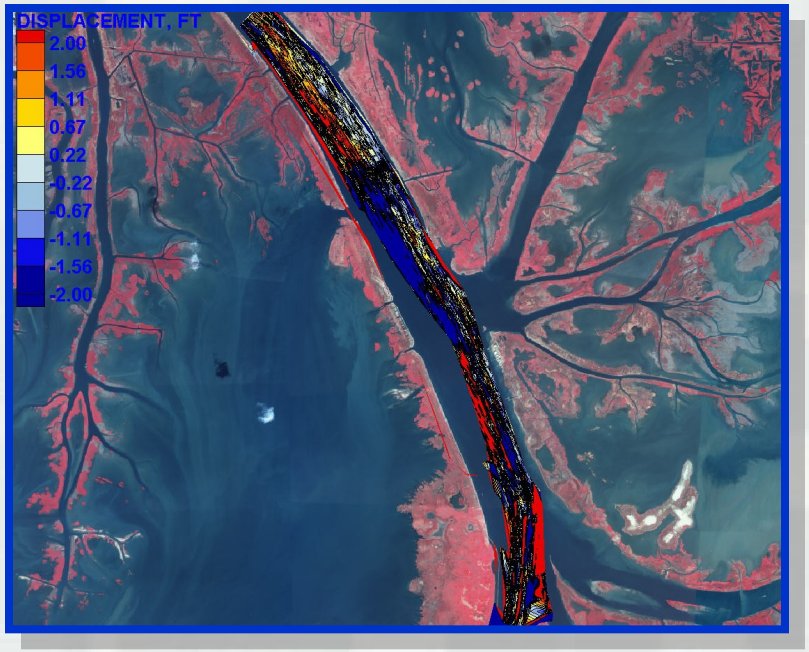
River Mile 2.46 – West Bay Diversion Open

2-D Model Computed Bed Change



2-D Model Results Comparison

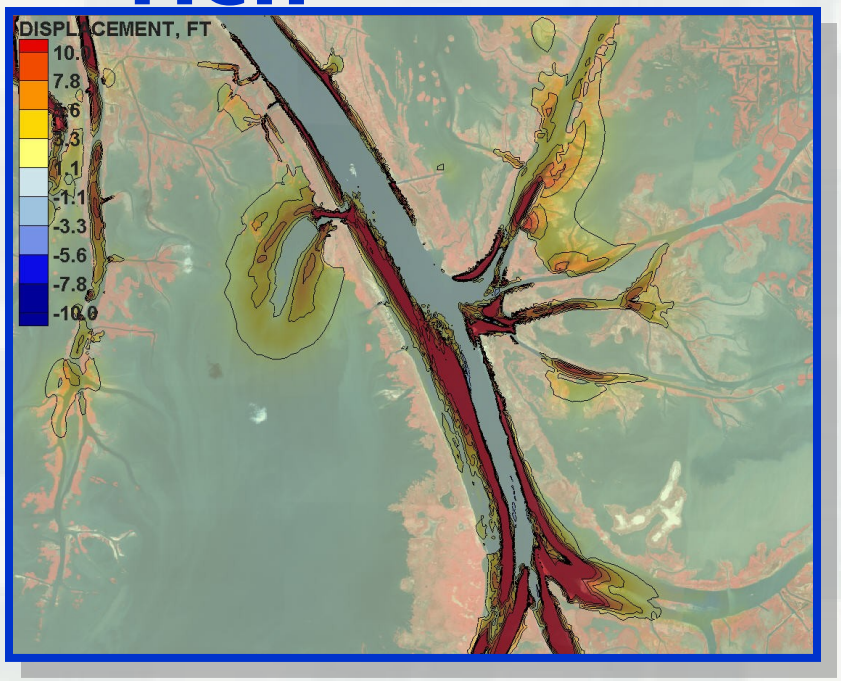




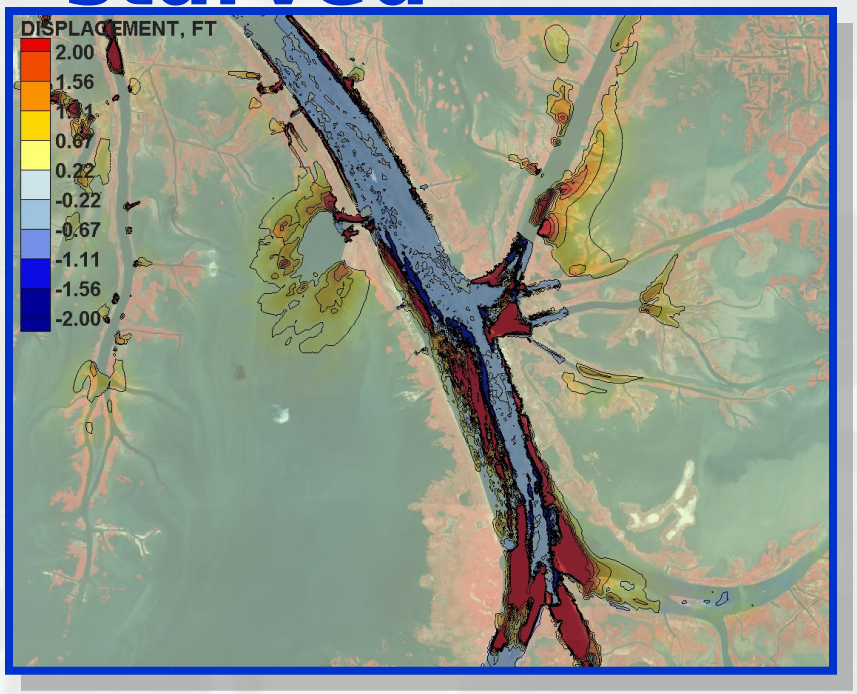
Comparison of Modeled and Observed
Bathymetric Difference

2-D Model Cumulative Bed Change

Sediment-rich



Sediment-starved



OPPORTUNITIES

- Collaborate to identify monitoring needs
- Collaborate on sediment processes library
- Continue dialogue about monitoring & modeling capabilities
- Brief on other areas of common interest